

# **Eastern Divide Insect and Disease Project Phase II**

## **Soil and Water Resources Report**

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For: Eastern Divide Ranger District, George Washington-Jefferson National Forest  
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### **Background**

#### **Issues Addressed**

The issue of herbicide use and potential adverse effects to water quality in the 9A1Source Water Protection Watersheds management prescription was identified by the responsible official. Alternative A precludes herbicide use and is analyzed herein along with the Proposed Action.

#### **Methodology**

Potential project effects to soil and water quality were assessed through field surveys and remote analysis. A GIS analysis of proposed harvest units, temporary roads, skid trails, and log landings (M. Miller, George Washington-Jefferson NF, written communication) was performed. A separate effects analysis for the proposed Dismal Area units was completed previously by Forest Hydrologist Pauline Adams on August 1<sup>st</sup>, 2019 (USFS 2019). Further analysis of the Dismal Area is not included in this report.

#### **Resource Indicators and Measures**

Potential direct and indirect effects of project activities to soil and water quality are assessed through use of resource indicators:

1. Risk of chemical (herbicide) loading to water bodies.
2. Risk of detrimental soil disturbance in the project area.
3. Risk of sediment loading to water bodies.

The following resource measures are used to analyze potential effects to soil and water quality, and the likelihood of adverse effects:

1. The risk of chemical loading is measured by the aerial extent (acres) of proposed herbicide use and proximity of use to riparian corridors and waterbodies.

2. The risk of detrimental soil disturbance (Page-Dumroese et al 2009) is measured by the extent of proposed temporary roads, skid trails, and log landings, and the extent of activities proposed on slopes > 35% grade.
3. The risk of sediment loading is measured by the number (count) of proposed temporary road and skid trail channel crossings.
4. The risk of sediment loading is also measured by the extent of potential detrimental soil disturbance in analysis watersheds and proximity to riparian corridors and waterbodies.

Measures of soil disturbance are quantified based on assumed widths of temporary roads and skid trails, and aerial extents of log landings. Table 1 displays dimensions of roads, skid trails, and log landings used in the analysis based on discussions with George Washington-Jefferson NF staff (M. Miller, George Washington-Jefferson NF, written communication).

**Table 1 Dimensions of temporary roads, skid trails, and log landings used to measure project effects.**

Feature	Extent	Short-Term Disturbance	Long-Term Disturbance
Temporary Road	35' wide	35' wide	20' wide
Bladed Skid Road	14' wide	14' wide	12' wide
Unbladed Skid Road	12' wide	12' wide	0
Log Landing	0.5 acres	0.5 acres	0.25 acres

## Scope of Analysis

Effects analysis is performed in the context of watersheds containing proposed activities. In consultation with the Forest Fish Biologist five watersheds were defined for effects analysis (D. Kirk, George Washington-Jefferson NF, personal communication). These watersheds were chosen because it is expected that effects below these points in the channel networks would be immeasurable (Table 2).

**Table 2 Analysis watersheds and proposed harvest units.**

Watershed	Watershed Area (Acres)	Sale Area Units <sup>1</sup>	Total Unit Area (Acres)
Little Walker Creek-Walker Creek 6 <sup>th</sup> Field HUC	38,486	Bromley Hollow # 1 – 8, Walker Mountain # 3	150.0
Peak Creek above Gatewood Reservoir Dam	15,788	Peak Ck # 1 – 6	86.5
Pondlick Creek at Tract Fork Creek	3,399	Gatewood Reservoir # 8 – 10	89.3
Peak Creek below Gatewood Reservoir Dam	21,123	Tunnell Hollow # 1 – 5, Caseknife # 1, 2, 3 (portion), 4, 5 (portion), 6, 7	199.0

<sup>1</sup> Dismal Area units are not included as they were analyzed in an earlier report.

Brown Lick Branch at Beaverdam Creek	3,073	Caseknife # 3 (portion), 5 (portion)	27.2
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Effects to soil and water quality occur on different time scales (Table 3). Direct effects to soil quality occur where soil is subject to detrimental disturbance by grading of temporary roads, skid trails, and log landings (Page-Dumroese et al 2009). These soils are affected long-term and may require more than 100 years for site productivity and sustainability to recover (J. Howard, George Washington-Jefferson NF, personal communication).

Direct effects to water quality occur at channel crossings where fine material in stream banks and bed is mobilized and produces turbidity. Indirect effects result when upland soil erosion or herbicides are mobilized and delivered to receiving waters. Effects to water quality are primarily short-term. Within two years after sale areas are closed herbaceous vegetation should become established from seed and volunteers on temporary roads and log landings. This vegetation substantially reduces the risk of surface erosion and of sediment loading to waterbodies. Bladed skid trails are expected to be covered with slash (J. Overcash, George Washington-Jefferson NF, personal communication) and this treatment should reduce the risk of surface erosion immediately after application, depending on site characteristics.

**Table 3 Time scales of project effects to soil and water quality.**

Resource	Short-Term Effects	Long-Term Effects
Soil Quality	< 100 years	> 100 years
Water Quality	2 years	NA

## Environmental Consequences

### No-Action Alternative

A “No Action” alternative was not specifically analyzed under the assumption that no action would maintain the status quo of soil and water quality and trends.

### Proposed Action Alternative

The proposed action alternative includes regeneration timber harvest on approximately 1,170 acres under shelterwood with reserves and coppice with reserve methods. Ground-based logging systems will be used, and approximately 13 miles of temporary roads (existing and new segments) are needed to access the treatment areas. A 20% solution of triclopyr herbicide will be applied to the basal bark of individual non-native and undesirable species on approximately 880 acres, primarily in shelterwood units. Refer to the project Environmental Assessment for further description of the proposed action.

## Direct and Indirect Effects of the Proposed Action

### Soil Quality

The risk of detrimental soil disturbance by watershed was estimated at 2 to 17 acres short-term and 1 to 9 acres long-term (Table 4). The maximum proportion of sale area(s) subject to short- and long-term soil disturbance was approximately 10% and 5%, respectively. The maximum proportion of watersheds impacted by short- and long-term soil disturbance was 0.15% and 0.07%, respectively.

**Table 4 Soil disturbed by sale area(s) and watershed.**

Watershed	Watershed Area (Acres)	Sale Area(s) (Acres)	Total Acres Disturbed		% Sale Area(s) Disturbed		% Watershed Area Disturbed	
			Short-Term	Long-Term	Short-Term	Long-Term	Short-Term	Long-Term
Little Walker Ck-Walker Ck 6 <sup>th</sup> Field HUC	38,486	150.0	12.4	5.3	8.3	3.6	0.03	0.01
Peak Ck above Gatewood Reservoir Dam	15,788	86.5	9.0	4.0	10.3	4.6	0.06	0.03
Pondlick Ck at Tract Fork Ck	3,399	89.3	5.2	2.3	5.9	2.6	0.15	0.07
Peak Ck below Gatewood Reservoir Dam	21,123	199.0	16.5	8.5	8.3	4.3	0.08	0.04
Brown Lick Branch at Beaverdam Ck	3,073	27.2	2.4	1.0	8.8	3.5	0.08	0.03

Long-term soil disturbance in the activity areas is under the threshold established in Forest-Wide Water and Soil Quality Standards (Revised Land and Resource Management Plan Jefferson National Forest [herein Forest Plan], pg. 2-7):

***FW-5:** On all soils dedicated to growing vegetation, the organic layers, topsoil and root mat will be left in place over at least 85% of the activity area and revegetation is accomplished within 5 years.*

Nine of the thirty analyzed harvest units have 10% or more of their area on slopes in excess of 35% grade. The estimated percent of sale areas on slopes over 35% grade ranged from 1% for Caseknife to 27% in Tunnel Hollow (Table 5).

**Table 5 Percent of sale areas on slopes over 35% grade.**

<b>Sale Area</b>	<b>Portion of Sale Area with Slopes &gt; 35%</b>
Bromley Hollow	15.1 %
Caseknife	0.8 %
Gatewood Res	4.4 %
Peak Ck	15.0 %
Tunnel Hollow	27.3 %
Walker Mtn	0.0 %

Mechanical equipment operation on steep slopes risks damaging soils through displacement, rutting, compaction, and subsequent surface erosion. However, forest-wide standards that tier to state-level Best Management Practices (BMP) are applied to maintain soil productivity and sustainability (Forest Plan pg. 2-7):

***FW-1:** Resource management activities that may affect soil and / or water quality follow Virginia, West Virginia, and Kentucky Best Management Practices, State Erosion Control Handbooks, and standards in the Forest Plan.*

The State of Virginia Department of Forestry recommends that overland log skidding be limited to slopes under 35% (Virginia's Forestry Best Management Practices for Water Quality Field Guide [2009], pg. 39). Field-validation of steep slopes and application of this BMP during implementation will limit short- and long-term soil disturbance.

### **Water Quality**

Direct, short-term (within 2 years) effects to water quality are expected at nine channel crossings identified using the forest's "modeled streams" GIS data in the sale areas (Table 6).

**Table 6 Temporary road and skid trail channel crossings by watershed.**

<b>Watershed</b>	<b># of Channel Crossings<sup>2</sup></b>		
	<b>Temp Road</b>	<b>Bladed Skid</b>	<b>Unbladed Skid</b>
Little Walker Ck-Walker Ck 6 <sup>th</sup> Field HUC	0	5	1
Peak Ck above Gatewood Reservoir Dam	0	0	2
Pondlick Ck at Tract Fork Ck	0	0	0

<sup>2</sup> Based on intersections of modeled streams and preliminary logging plan data in GIS.

Watershed	# of Channel Crossings <sup>2</sup>		
	Temp Road	Bladed Skid	Unbladed Skid
Peak Ck below Gatewood Reservoir Dam	1	0	0
Brown Lick Branch at Beaverdam Ck	0	0	0

Channel crossings need to be located at designated locations, use improvement structures (e.g. culverts, temporary bridges), and be removed and rehabilitated (Forest Plan, pgs. 2-8 and 2-35):

**FW-12:** *Motorized vehicles are restricted in the channeled ephemeral zone to designated crossings. Motorized vehicles may only be allowed on a case-by-case basis, after site-specific analysis, in the channeled ephemeral zone outside of designated crossings.*

**FW-20:** *When crossing channeled ephemeral streams, culverts, temporary bridges, hardened fords, or corduroy are used where needed to protect channel or bank stability.*

**FW-21:** *Construction of crossings is completed on all channeled ephemerals as soon as possible after work has started on the crossing. Permanent and temporary roads on either side of crossings within the channeled ephemeral zone are graveled.*

**FW-129:** *Skid trails may cross riparian corridors at designated crossings. If crossing a perennial or intermittent stream is unavoidable, use a temporary bridge or other approved method within the State Best Management Practices (BMPs). All streams are crossed at as close to a right angle as possible. Restoration of skid trails will occur as soon as possible to mitigate impacts.*

**FW-132:** *Temporary stream crossings will be removed and rehabilitated.*

These standards reduce the risk of sediment loading to water bodies. Effects to water quality are expected from storm events during implementation and after sale areas close but before herbaceous vegetation is established on skid trails. These effects should not persist beyond the short-term (2 years).

Indirect, short-term effects to water quality could occur if herbicide applied in upland areas is mobilized and delivered to receiving waters. Triclopyr will be applied with an adjuvant to the basal bark of non-native and other undesirable species. However, the herbicide will not be applied within a 30' buffer around wetlands and perennial and intermittent springs and streams. Triclopyr is not soil active and adheres to soil particles. The chemical properties of Triclopyr, method of application (non-aerial), and the buffer width designed for water bodies is expected to prevent pollution of water bodies.

### **Cumulative Effects of the Proposed Action**

Effects of Forest Service and non-Forest Service roads and trails on soil and water quality in the analysis watersheds is ongoing and not expected to change appreciably in the foreseeable future. Legacy detrimental soil disturbance from previous timber harvest features (temporary roads, bladed skid trails, and log landings) is likely still present in the analysis watersheds, but these activities are not still producing measurable water quality effects. Prescribed fire is anticipated for the Gatewood Area, but prescribed fire is typically of low- to moderate intensity and does not produce adverse effects to soil or water quality. No other timber harvest projects are currently planned in the area.

### **Alternative A**

Project Alternative A includes all of the actions described for the proposed action apart from herbicide treatments for Units 1, 2, and 4 in the Peak Creek Sale Area. These units are excluded from herbicide use because they fall within the 9A1Source Water Protection Watersheds management prescription. The total area excluded from herbicide treatments is approximately 40 acres.

### **Direct and Indirect Effects of Alternative A**

Direct and indirect effects of Alternative A to soil and water quality are expected to be about equal to those from the Proposed Action. There may be a lower risk of water quality effects (herbicide) under Alternative A, but the difference in risk between the alternatives is difficult to quantify.

### **Cumulative Effects of Alternative A**

Cumulative effects of Alternative A are expected to be equal to those from the Proposed Action.

## **Consistency with Relevant Laws, Regulations, and Policy**

### **Federal Law**

#### **Clean Water Act**

The Federal Water Pollution Control Act, (Clean Water Act) (33 USC 1251, 1254, 1323, 1324, 1329, 1342, 1344) as amended, intends to restore and maintain the chemical, physical, and biological integrity of the nation's waters. Required are (1) compliance with State and other federal pollution control rules, (2) no degradation of in-stream water quality needed to support designated uses, (3) control of non-point source water pollution by using conservation or "best management practices", (4) federal agency leadership in controlling non-point pollution from managed lands, and (5) rigorous criteria for controlling discharge of pollutants into waters of the United States.

## **Forest Service Policy**

### **Forest Service Manual Sections 2532.02, 2532.03**

Describes the objectives and policies relevant to protection (and, where needed, improvement) of water quality on National Forest System lands so that designated beneficial uses are protected.

### **Forest Service Manual Section 2509.22**

Describes the policies and objectives relevant to soil and water conservation practices, the practices themselves, and directs the Forest Service to implement these measures as a means of preventing or mitigating non-point source pollution.

### **Forest Service Manual Chapter 2550**

The National Soil Management Handbook defines soil productivity, components of soil productivity, and establishes guidance for measuring soil productivity. In determining a significant change in productivity, a 15% reduction in inherent soil productivity potential will be used as a basis for setting threshold values. Threshold values would apply to measurable or observable soil properties or conditions that are sensitive to significant change. The threshold values, along with areal extent limits, would serve as an early warning signal of reduced soil productive capacity, where changes to management practices or rehabilitation measures may be warranted.

Adherence to the Forest Plan and Virginia's Forestry BMP is expected to protect soil and water quality in compliance with the Clean Water Act and the Forest Service Manual.

## **Land and Resource Management Plan**

Relevant Forest Plan standards are included previously in the report.

## **Other Relevant Law, Regulation, or Policy**

### **Virginia's Forestry Best Management Practices**

Adherence to Virginia's Forestry Best Management Practices for Water Quality is required by the Forest Plan (Forestwide Water and Soil Quality Standard 1). The following sections of the VA BMP manual are relevant to the project:

- Skid Trails
- Stream Crossings
- Log Landings
- Erosion Control Measures
- Revegetation

## **Conclusion**

The project Proposed Action is expected to produce detrimental soil disturbance within limits established by the Forest Plan. It is also anticipated that water quality may be affected by sediment loading over the short-term, but measurable long-term water quality effects should not occur if Forest Plan standards and Virginia's Forestry BMP are adhered to. Water quality is not expected to be affected by herbicide use under either the Proposed Action or Alternative A.

## **References Cited**

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